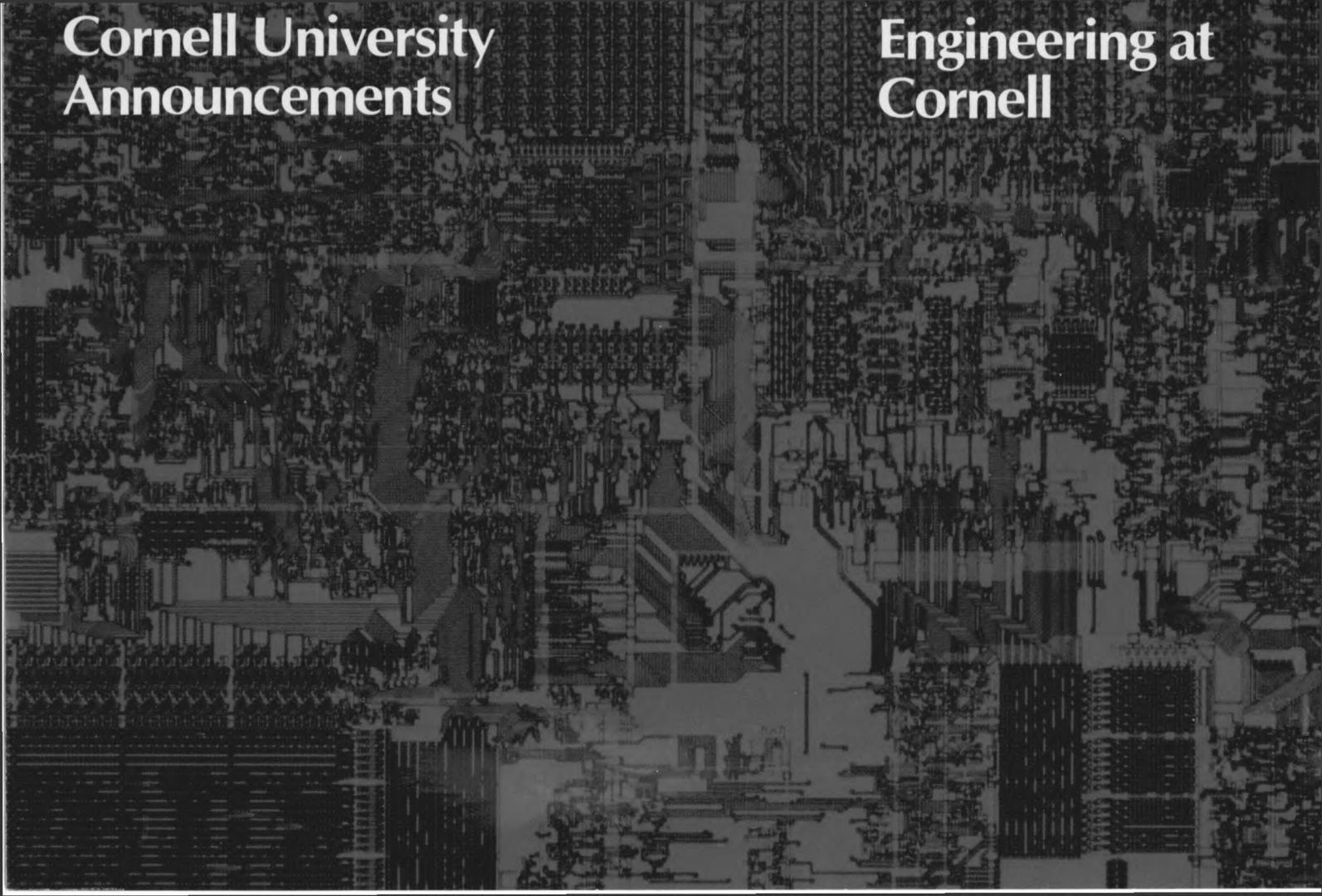
Cornell University Announcements

Engineering at Cornell



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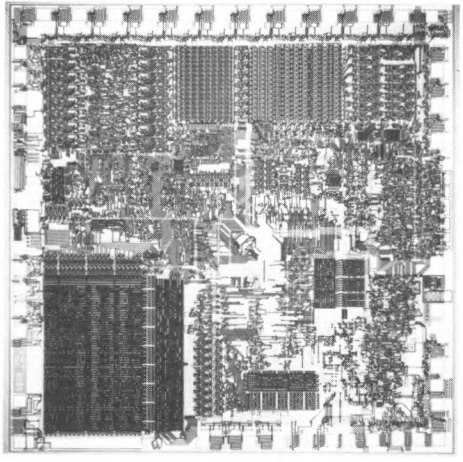

Cornell University Announcements (USPS 132-860)

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Cover photograph: This Intel 8086 microprocessor chip, an example of the latest generation of very small computers, is actually about a quarter inch square and contains approximately 35,000 transistors.

Engineering, Cornell, and You

If you are inclined toward a science-oriented profession with substance and significance — and good job opportunities — engineering may be the right career choice for you.

If you want a sound, practical, and well-rounded education at a diverse university of international reputation, Cornell may be the right school for you.

Cornell is a special place to study engineering. Part of this University's appeal lies in its excellent academic programs, its vitality, and its interesting people. Part comes from its unique setting: an outstanding campus in a beautiful countryside overlooking an attractive city of just the right size to enhance university life.

In this booklet we hope to give you an idea of what it is like to study engineering at Cornell. This isn't a course catalog or a complete handbook of information — such publications are available — but we hope it will help you decide whether the Cornell College of Engineering is the place for you.

About Engineering

The traditional purpose of engineering has been to serve society through technology. And today engineers are as important as ever in providing goods and services. Our society needs people who can design agricultural equipment, build power plants, plan transportation systems, devise methods for pollution control, manufacture products, and fill leadership and management roles.

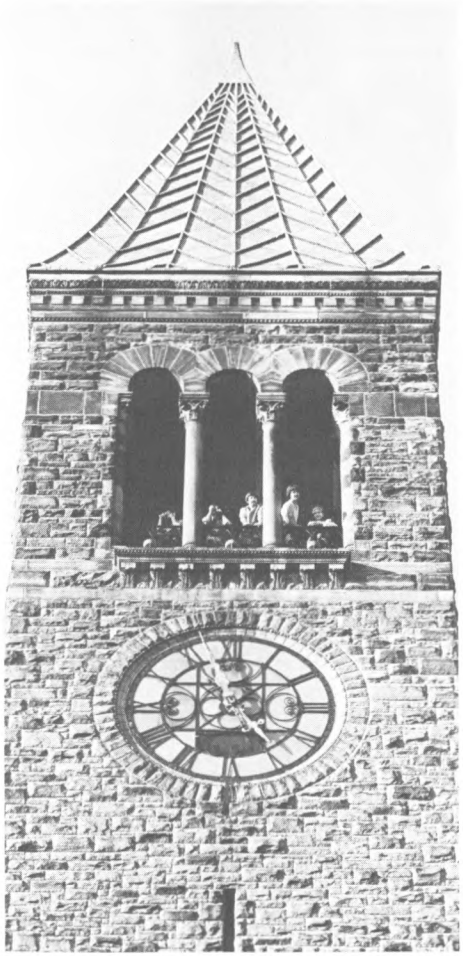
Yet this is no longer enough. The growing influence of technology in all aspects of modern life requires that an engineer work within a broader context than ever before. The building of a highway or power plant, for example, involves a range of economic, social, and environmental factors in addition to the technical ones. It is increasingly necessary for society to make choices, to consider what engineers and economists call trade-offs. At what cost should our environment be protected — or left unprotected? Do the advantages of nuclear energy production offset the hazards? What is the best balance between conservation of energy and increased production, and what are the best ways of achieving it? Engineers must be prepared to help make such decisions, for the fact is that none of the urgent problems of modern society can be solved without technological contributions.

As the scope of engineering expands, new disciplines and interdisciplinary fields are emerging; these changes are reflected, and often anticipated or encouraged, by progressive engineering schools. In addition to such long-established specialties as civil, mechanical, chemical, industrial, and electrical engineering, there are more recently emerged fields such as agricultural engineering, environmental engineering, bioengineering, geological sciences, computer science, materials science, and operations research. Interdisciplinary work may involve several different engineering disciplines, or it may entail team efforts by engineers and other specialists such as physicians, theoretical physicists, economists, or government officials.

Engineering today is a diverse and vital profession, offering more opportunity than ever before for interesting and meaningful work.

About Cornell

When Cornell was founded, more than one hundred years ago, a radical idea in education was introduced: Traditional academic studies would be combined with practical subjects such as engineering and agriculture so that, in the words of the founder, Ezra Cornell, "any person can find instruction in any study." Over the years scholarship, the arts and sciences, and the more practical studies have flourished together and made Cornell a vital institution and a true university.



From the beginning, then, engineering has been an integral part of Cornell. Early instruction in civil engineering and the "mechanic arts" expanded as new fields opened up, and Cornell took and maintained a leadership role in engineering education. It developed the first undergraduate electrical engineering program in the nation, for example, and it pioneered the development of curricula in industrial engineering, mechanical engineering, engineering physics, and operations research. Today the College of Engineering maintains its place as an active and important division of the University.

It is equally true that the University environment has been and is an important part of Cornell engineering education. Those who graduate as Cornell engineers have had not only an excellent professional or preprofessional education but also the opportunity to draw upon the richness of the University curricula, including offerings of the College of Arts and Sciences, the School of Industrial and Labor Relations, and the College of Agriculture and Life Sciences. They have lived and worked with people of many interests, from all over the world. They have participated in the life of a great university.

When you come to Cornell as a freshman, you will be housed with students from seven undergraduate colleges. Many of your activities will be centered on the Engineering Quadrangle, but you will take some of your classes at other colleges and attend meetings and events all over the campus. You can shape your education and your college life to suit your inclinations. The whole University will be your province.

"There is the opportunity here to do whatever you really want to."

About You

You have the qualifications to be a successful engineering student if you like and are good in science and mathematics and are willing to work hard.

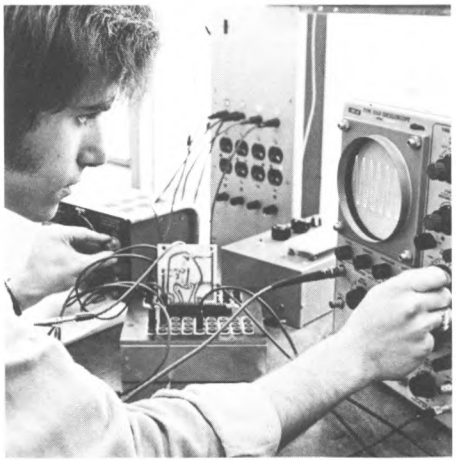
You have the makings of an engineer if, in addition, you have the potential for applying knowledge creatively; problem solving is the hallmark of the engineering approach. You will also need the willingness to adapt to change — to keep up with technical advances and respond to current needs of society. Management and decision-making abilities are assets, for engineers often assume leadership positions in industry. And any other special abilities or aptitudes you may have can be well utilized in the diverse profession of engineering.

If you have a nonengineering field in mind or are uncertain of your goals but are attracted by the engineering approach, you may do well to choose an engineering undergraduate program. The discipline and orientation of the curriculum make it an excellent preparation for many careers. As your abilities and interests develop, you will be able to direct your education in the way that is best for you.

The Programs

As a freshman entering the College of Engineering you will be enrolled in the Division of Basic Studies, which provides a good base for more specialized study during subsequent years. The basic studies plan also gives you the opportunity to gain some exposure to the many branches of engineering before choosing your major field, and the chance to consider career possibilities in interdisciplinary or nonengineering fields for which a curriculum directed toward science and mathematics is good preparation.

There are ten field programs in engineering specialties to choose from, and most of them are integrated with an optional fifth-year professional master's degree program. An alternative is the College Program, which allows you to pursue a novel or interdisciplinary course of study with an individualized curriculum. An important element of all the programs is the chance to participate in engineering design or research projects; you will be able to experience the excitement and challenge of actually applying your skills while you are still in school. All the programs include liberal studies electives. In addition to the six hundred courses offered by the College of Engineering, there are several thousand courses offered by other units of the University.

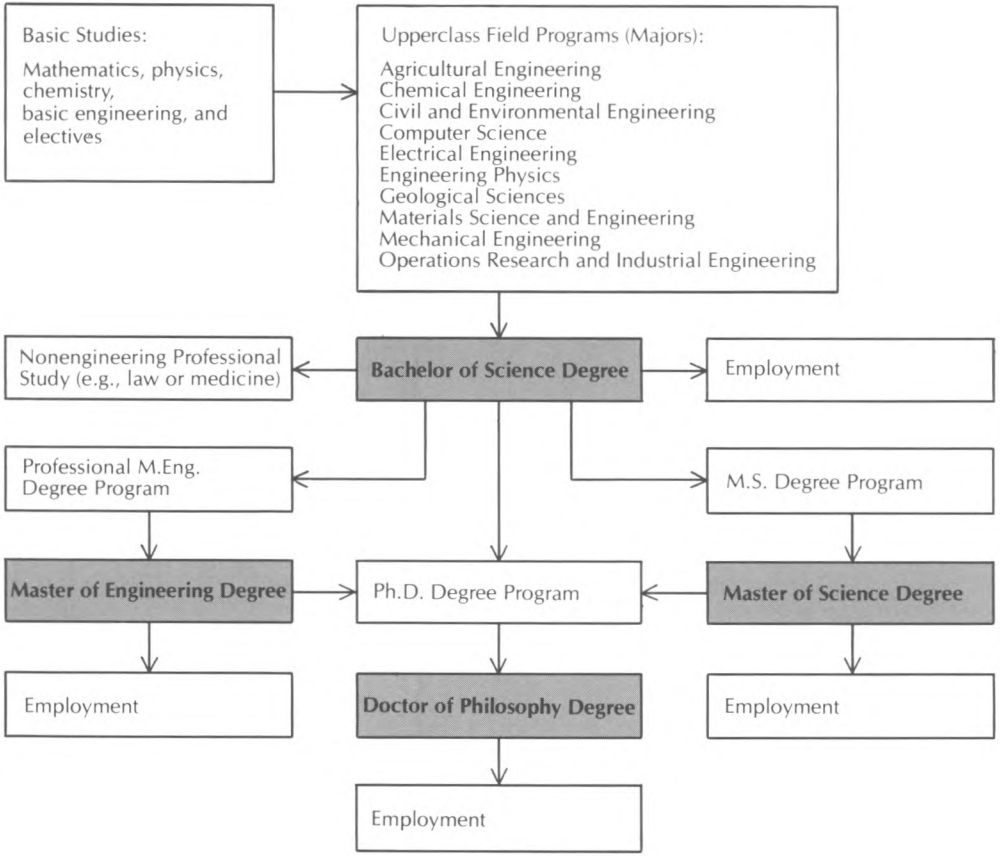


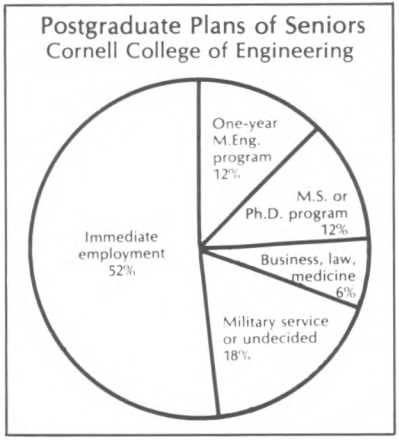
Another advantage of the University structure is that it makes possible a number of special curriculum arrangements. For example, agricultural engineering is a joint offering of the College of Engineering and the College of Agriculture and Life Sciences (where students begin the program). Dual registration in the College of Engineering and the College of Arts and Sciences allows well-qualified students to earn both a B.S. and an A.B. degree. A cooperative program with the Graduate School of Business and Public Administration makes it possible to earn the B.S. and M.Eng. degrees in engineering and a master's degree in business in six years.

A popular option is the Engineering Cooperative Program, which provides almost a full year of paid professional experience to qualified students without extending the date of graduation. Co-op assignments, undertaken during one fall term and several summers, are available with more than sixty companies.

"The main point of Cornell is that it offers so much and has such diversity. It is a good environment for an engineering student because an engineer can't be isolated — not in real life and not here."

Programs and Options in Cornell Engineering Education





Cornell Engineering Enrollments*

Basic Studies	1,195
Agricultural Engineering	25
Chemical Engineering	143
Civil and Environmental Engineering	105
College Program	10
Computer Science	19
Electrical Engineering	329
Engineering Physics	69
Geological Sciences	12
Materials Science and Engineering	33
Mechanical Engineering	239
Operations Research and Industrial Engineering	145
Total undergraduate	**2,324**
M.Eng. candidates	158
M.S. and Ph.D. candidates	543

Cornell University Enrollments*

Ithaca Divisions	
Total undergraduate	**12,064**
Total graduate and professional	**4,899**

*Fall 1979.

Cornell Faculty*

College of Engineering	220
Total for Ithaca divisions	**1,505**

Estimated Expenses at Cornell Endowed Colleges†

Tuition	$5,860
Matriculation fee (entering students)	50
Room and board	2,450
Books and supplies	260
Personal expenses	630
	$9,250

Financial Aid Summary

- Financial aid is awarded almost entirely on the basis of need, as a package of scholarships, loans, and occasionally an on-campus job.
- More than two-thirds of all Cornell undergraduate engineering students receive some amount of financial aid.
- More than $600,000 in scholarship grants is awarded each year to engineering freshmen.

†1980–81.

Dates and Deadlines

Admission Applications Due

Regular: January 15

Transfer: for fall term, March 15; for midyear admission, November 1

Early Decision Plan: November 1

Admission Decisions Announced

Regular: as decisions are made in February, March, and early April

Transfer: by early May

Early Decision Plan: December or January

Financial Aid Applications Due

Regular and transfer: January 15

Early Decision Plan: November 1

Financial Aid Decisions Announced

Regular: by mid-April

Transfer: by mid-May

Early Decision Plan: by January 1

Date Applicant Must Advise Cornell of His or Her Decision

Regular: May 1

Early Decision Plan: applicants are advised

The Campus

Cornell's main campus is on a hillside overlooking Cayuga Lake and the city of Ithaca in the Finger Lakes region of New York State. The campus is large, but buildings are grouped according to academic areas, and each college has a physical as well as a functional identity. The Engineering Quadrangle, with its ten modern buildings, is one of the newest areas of the campus.

The Cornell campus is rightly celebrated for its natural beauty. Among its unique features are two gorges: Fall Creek Gorge, which opens out below Beebe Lake near the north end of the campus, and Cascadilla Gorge, which borders the Engineering Quadrangle on the south edge. Just walking around the campus — crossing the bridges and looking out over the hills — is part of the Cornell experience. Of course, no one will deny that the dash up Library Slope from the dormitories to the engineering campus can be quite a challenge on a snowy morning.

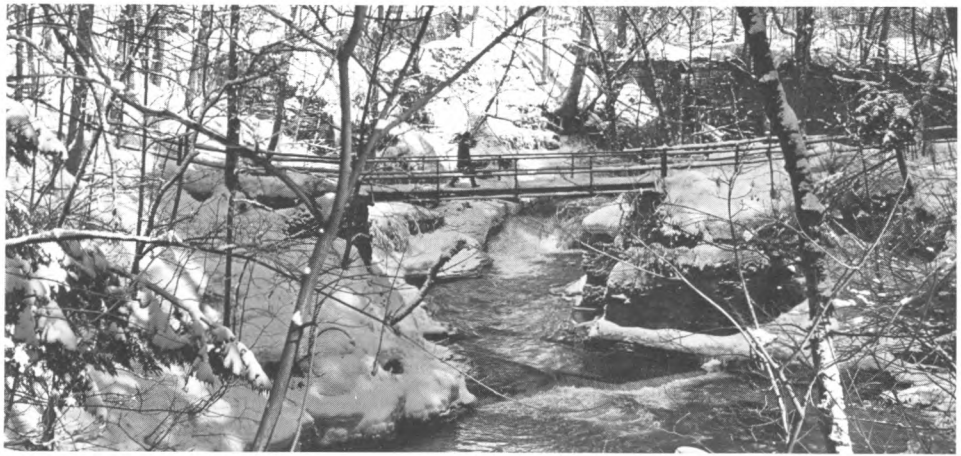
Below the campus lies Ithaca, a city of forty thousand, with its attractive central mall, theaters, restaurants, stores — the amenities students often welcome. Beyond the campus and city lies the beautiful countryside — lakes, forests, state parks, even a nearby ski area. It's no wonder that Cornellians are notorious for their attachment to the campus and the region.

The essential purpose of the physical plant, of course, is to provide for the academic, research, and personal needs of the students and faculty. As a student in the College of Engineering you will be aware of the spacious and well-equipped classrooms and laboratories and impressed with the excellence of the library system (which includes a large undergraduate library and a special engineering library), and the University's computer system.

You will also be concerned with the nonacademic facilities. There is a range of housing accommodations to suit individual tastes, and a variety of eating places. Provisions for extracurricular activities include three student unions and many other recreational facilities.

Important to many students are the athletic programs, both the Ivy League interscholastic sports and the vigorous intramural program. Facilities include a stadium, two practice fields, gymnasiums, bowling alleys, squash courts, swimming pools, tennis courts, a golf course, and an ice-skating rink.

Facilities appropriate to the cultural and intellectual life of a great university include a new art museum, auditoriums, theaters, chapels, and meeting rooms.

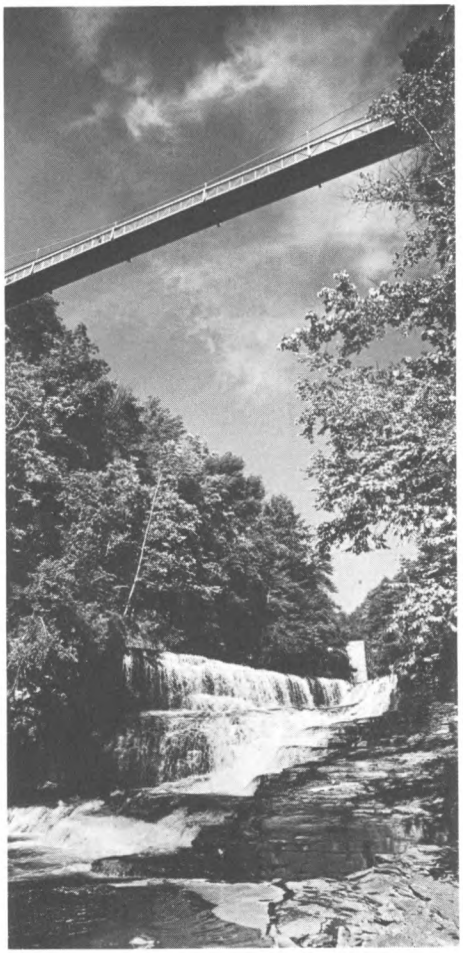


The campus has many different kinds of places to study or just relax. You may soon find a favorite corner in one of the libraries. You may like to take a midmorning break in one of the lounges in the engineering buildings to have a cup of coffee and informal discussion with faculty members and fellow students. You may enjoy dropping in at the coffeehouses on campus, where there is sometimes live music or poetry.

Special places include the Arts Quadrangle, site of the original University buildings; the huge campus of the College of Agriculture and Life Sciences, including fields and pastures; and the veterinary college facilities. There are gardens, experimental plantations, and a bird sanctuary. There are the wooded paths around Beebe Lake. There is a bell tower with chimes.

The heart of any university is its academic programs, but its character and meaning stem also from its physical presence. At Cornell students find an environment that becomes an intrinsic part of their college experience.

"I chose Cornell because of the good engineering curriculum, the advantages of attending a university rather than a technical school, and the small-town setting."

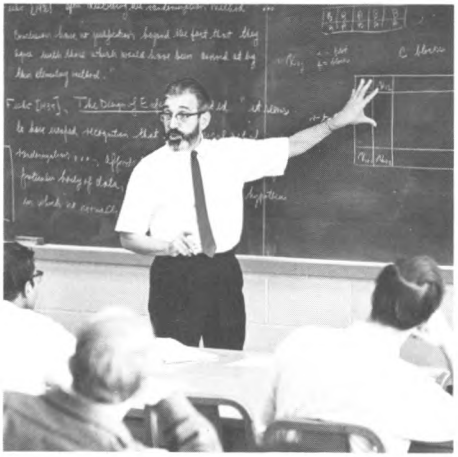


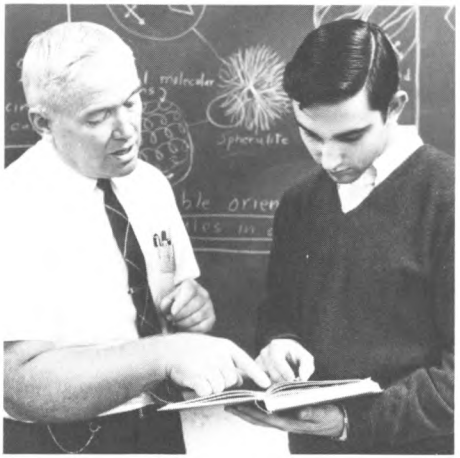
The People

The people of a university or college are the students, the faculty, the administrators, and the nonacademic personnel. At this university, these people are sometimes referred to as the Cornell community. It is a large group and one that is as interesting as can be found anywhere.

Your first concern will be with your fellow students. They represent a variety of ethnic and social groups and come to Cornell from all over the United States and from some ninety foreign countries to study everything from the arts to zoology. Besides future engineers you will meet aspiring agriculturalists, scientists, architects, linguists, lawyers, physicians, hotel administrators, writers, business people, veterinarians — future members of practically any profession you can name. Your roommate may be from Butte, Montana. Your laboratory partner may be on the soccer team. Your classmates, some of whom will probably become your lifelong friends, will be future leaders and workers in the whole spectrum of occupations.

You will also be concerned with the faculty. Perhaps your first encounter will be with your adviser, selected for you from the engineering faculty. Your next close contacts may be with your teachers from the College of Engineering and from





faculties in science, mathematics, social sciences, and liberal studies. As you continue through your undergraduate and perhaps graduate years, you will get to know many professors, especially those in your chosen field of concentration. And in a university like Cornell the young and enthusiastic graduate teaching assistants are an important complement to the older faculty members.

The diversity of the faculty, even within a single college, is striking. In engineering there are more than two hundred professors, representing fifteen or so major disciplines and dozens of specialties. Some are experienced in professional engineering, and some are theoretical scientists. Many serve as industrial or professional consultants or are concerned with technological problems and projects on the local, national, or international scale. Some participate in interdisciplinary projects with people from other fields such as physics, chemistry, biology, medicine, economics, planning, ecology, or law.

"One of the reasons I came to Cornell is that I thought there would be a cosmopolitan and stimulating atmosphere, with people of many backgrounds working in a variety of fields of great interest to them — and this expectation has been realized."

Faculty research interests range from highly technical studies to broad areas of public policy or technology assessment, and from theoretical investigations to applicable technology or industrial management. There are specialists in high-power lasers, x-ray diffraction, electron microscopy, and thermonuclear fusion. In celestial mechanics and ionospheric physics. In bioengineering and bioelectronics. In microwave communication devices, electric cars, planetary rovers, and magnetically levitated vehicles. In high-power electricity transmission, energy conversion, the hydrogen economy, radiation damage of materials, and nuclear engineering. In aerial photography, remote sensing, and photogrammetry. In seismology, tectonics, and geophysical prospecting. In water quality control, land-use planning, and transportation systems. In chemical processing, polymeric materials, and artificial kidney machines. In waste treatment, automotive pollution control, thermal pollution, and sonic boom. In operations research, game theory, information systems, and computer programming. The list goes on.

As an engineering student you will have contact with faculty members in many areas of engineering and applied science, as well as with experts in whatever field you decide to make your specialty. As a Cornell student you will be exposed to an even broader spectrum of faculty interests,

activities, and attitudes. The Cornell faculty is excellent. The special relationship of teacher and student is one of the rewarding aspects of college life, and at Cornell it is enhanced by the quality of the teaching staff and fostered by the high ratio of faculty members to students.

People are an important part of any education. As a Cornell student you will be part of a stimulating, varied, and vital academic community.

Student Life

As a new Cornellian one of your first concerns, aside from academic ones, will be your living arrangements. There are no rules about where Cornell students may live, but there are a number of options. At some point you may decide to live in a fraternity or sorority house or a cooperative or a shared apartment in the city or surrounding countryside. But almost all incoming students, and a growing number of continuing students, choose to live on campus in University housing.

Dormitory living offers a number of possibilities. Some dormitories are reserved for men or for women only, but most are coeducational (usually segregated by floor or corridor). Most are traditional in design, but a group of recently built and popular dormitories are arranged on a suite plan. Single rooms, double rooms, suites, and a few apartments are available at various rates. Special facilities such as lounges, kitchenettes, and laundries are available. House rules are minimal; at Cornell students are considered adults capable of ordering their own lives.

The University offers several special-project houses such as Ecology House or the International Living Center. There are also two residential colleges: Risley, for those interested in the performing and creative arts (some engineering students

with interests in these areas elect to live there), and Ujamaa, for those especially concerned with studying the problems of developing communities. More detailed information on these accommodations is sent to students who are admitted to Cornell.

Dormitory complexes are located in two areas of the campus, each served by a student union with dining facilities, meeting and recreational rooms, music and study rooms, lounges, and special facilities (such as the darkroom in the North Campus Union).

Willard Straight Hall ("the Straight"), centrally located on campus, is another focal point for many campus activities. Besides having a variety of special-purpose and assembly rooms, the Straight has cafeterias, a theater, a browsing library, a newsstand, a ticket office, and even a barbershop.

The arrangements for dining are as optional as those for housing. Although there is an extensive and flexible campus dining plan available, it is not required. There are dining rooms, cafeterias, and coffee shops in various places on campus and also in nearby city neighborhoods. Some people do their own cooking, especially if they live in co-ops or private housing.

Student life is, of course, considerably more than going to classes, studying, eating, and sleeping. Extracurricular activities are numerous and varied, and every student has a virtually unlimited opportunity to work out a congenial program. Some four hundred student organizations foster a wide spectrum of cultural, recreational, intellectual, political, social, and religious interests. You can participate in campus affairs and policy making through the Campus Council and various committees. You can participate in interscholastic or intramural sports (engineers are well represented on Cornell's athletic teams); join a theater group; sing with the Glee Club, Sage Chapel Choir, or University Chorus; play in the University orchestra; work on the student newspaper or a special publication like the *Cornell Engineer;* or be on the radio station staff. You can attend any of the hundreds of programs, lectures, religious services, and special events that crowd the Cornell calendar.

Other publications will provide you with detailed information on all these aspects of University life. But what you actually do and how you do it is up to you. The Cornell experience is what you make it.

"The attractions of an engineering job are the same for a woman as for a man: interesting, challenging, and socially useful work that provides a good salary."

Advising and Counseling

Perhaps in the first confusing days on campus, or later in the term when you seem to be falling behind in your math work, when you are trying to decide on a major, or when a personal crisis develops, you will feel the need for help or at least conversation.

For an engineering student with a problem, the first recourse may be the faculty adviser. If he or she can't provide sufficient help of the right kind, a referral can be made. For academic or career problems there is also the Engineering Advising and Counseling Center, where students may consult with the director or staff members. Special programs to assist students in selecting their upperclass fields are offered by the center at various times of the year. The center also maintains a list of tutors and arranges group tutorials as the need arises. Printed material, including a newsletter for engineering underclass students, is available.

The advising program of the College of Engineering is supplemented by extensive resources of the University. These include the Office of the Dean of Students, the Department of University Health Services, the Reading and Study Skills Center, the Learning Skills Center, the Career Center, the Health Careers Evaluation Committee, Cornell United Religious Work, the

University Office of Admissions, and the Office of Financial Aid. Students not only have access to these organized counseling services but also are welcome to confer informally with residential advisers or staff and faculty members on any educational or personal matter.

Advising and counseling may begin even before matriculation. The college offers an optional prefreshman program called "SOS: Summer Orientation Sessions," which brings accepted students, and often their parents, to the campus for several days. Besides becoming better acquainted with the college and University, the students choose their fall-term courses and may take advanced placement tests in several subjects.

Help in choosing careers is offered from the freshman year on. This begins with the required freshman course Engineering Perspectives, which includes a series of lectures by professional engineers in different specialty fields. Then there are Decision Days, when the various upperclass engineering fields hold open house for underclass students.

Special career problems of women are explored in an annual panel discussion, "Industry and the Woman Engineer"; panelists include professional women in the field. Sophomore women are invited to participate in a special program of industrial assignments during the winter recess.

Because engineering-bound minority students may have extra needs in preparing for college work, special counseling and academic support services are offered to these students. An enrichment program, which is offered during the summer before freshman matriculation, is designed to strengthen skills in mathematics, the physical sciences, computer science, and communication arts. During the regular academic year advising and tutoring services are available. A special program provides sophomores with the opportunity to obtain on-the-job industrial experience for a short period between academic terms.

Placement Services

Help in obtaining permanent or summer employment is offered by the University Career Center and by the Placement Office at the College of Engineering. Interviews between students and prospective employers are arranged during two-week periods in the fall and in the spring; last year recruiters from more than three hundred fifty companies visited the campus. Workshops for students who will be looking for jobs are arranged by the Placement Office, and information about companies and employment opportunities is available. Members of the engineering faculty also serve as placement advisers in the different specialty fields.

"The day I received notice of admission, my parents and I took off for Cornell and fell in love with the campus."

"I will always remember my years at Cornell as a time in which I obtained much knowledge, not only academic, but in other areas of life vital for coping successfully with the world today."

Admission and Financial Aid

Although the College of Engineering is highly selective, there are no absolute standards for admission. An important factor is, of course, academic achievement and aptitude. College entrance examination scores are looked at, as are high school grades, class rank, and other available information. Personal qualities such as maturity, good work and study habits, leadership capability, and intellectual creativity are also considered, along with the applicant's motivation and awareness of the educational and professional possibilities in engineering.

The basic requirement for freshman admission is the completion of sixteen units of college-preparatory subjects. The following six units must be included: four of mathematics, one of physics, and one of chemistry. Those who are interested in bioengineering are advised to complete at least one unit of biology.

Each freshman candidate is required to take standardized admission tests. The preferred procedure is to take the College Entrance Examination Board Scholastic Aptitude Test (SAT) and the accompanying achievement tests in mathematics (level I or level II) and in either chemistry or physics. *These must be taken not later than January of the last year in high school.* Generally, it is recommended that the achievement test in science be taken in May of the junior year, in that science in which the applicant is then enrolled. The other alternative is to submit American College Testing (ACT) examination scores. These tests should be taken not later than the October test date.

About one-third of the students entering the College of Engineering as freshmen receive advanced placement and credit toward the B.S. degree. This is earned most often in mathematics, physics, and chemistry, but it is also received in other subjects such as biology, computer science, and history. A publication about advanced placement may be requested from the Office of Engineering Admissions, 223 Carpenter Hall.

The Early Decision Plan (EDP) is intended for highly qualified applicants whose college preference is Cornell; acceptance under this plan eliminates the need for making application to other colleges. Those candidates not offered EDP admission are considered again, without prejudice, under the normal admission review procedure.

The College of Engineering also welcomes inquiries from students who wish to

transfer from other universities and colleges, especially two-year schools with engineering science programs. A number of students from foreign countries also enter the college. Such candidates should communicate with the International Student Office in Barnes Hall.

No one should refrain from applying for admission because of financial circumstances. Admission decisions are made without regard to financial aid requirements; after admission has been granted, applicants for financial aid are considered for the available funds. Those who wish to be considered should submit an application for student aid along with the admission application (the form is included in the application packet). In addition, candidates for financial aid must file the Financial Aid Form (FAF) with the College Scholarship Service no later than January 1. The FAF form may be obtained from secondary school counselors.

Opportunity for All

Cornell University administers a variety of special opportunity programs designed to provide financial aid and other forms of assistance to minority students and to low-income students meeting program guidelines. The emphasis of these special programs is to aid in increasing representation of students from minority groups present in New York State who historically have been underrepresented in higher education. However, participation is also available to those residing outside New York State. For details prospective students should consult *Information for Applicants,* which accompanies each undergraduate application or will be sent upon request by the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14850.

It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, age, or handicap. The University is committed to the maintenance of affirmative action programs which will assure the continuation of such equality of opportunity.

A brochure describing services for the handicapped student may be obtained from the Office of Equal Opportunity, 217 Day Hall. Other questions or requests for special assistance may also be directed to that office.

Further Information

The publications *Announcement of General Information* and *Cornell University: Description of Courses* may be obtained by writing to Cornell University Announcements, Research Park, Building 7, Ithaca, New York 14850.

The application form for admission and financial aid may be obtained from the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14850.

The admission staff of the College of Engineering is helpful in answering questions and providing reading material about engineering fields and Cornell programs. Staff members are also ready to discuss individual problems related to such matters as entrance qualifications and finances. The address is Engineering Admissions Office, Cornell University, 223 Carpenter Hall, Ithaca, New York 14853.

Office of University Publications
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